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EXAMINER	
FLORES, LEON	

ART UNIT	PAPER NUMBER
2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/758,054	GARG ET AL.
	Examiner	Art Unit
	Leon Flores	2611

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 June 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,9-17,19,20,23 and 24* is/are rejected.

7)☒ Claim(s) *7-8, 18, 21-22, 25-26* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-26 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. **Claims (1 & 19) are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang. (US Publication 2005/0152486 A1)**

Re claim 1, Wang discloses a Rake receiver comprising: a Rake filter coefficient estimator that computes channel coefficients of each received channel component (See fig. 5: 402 & paragragh 70), wherein the Rake filter coefficient estimator computes a Rake filter coefficient for each estimated channel coefficient (See fig. 5: 406 & paragraph 70).

But the reference of Wang fails to explicitly that wherein the Rake filter coefficient estimator selects one or more Rake filter coefficients from the estimated channel coefficients based on channel characteristics.

However, the reference of Wang does teach that the L-rake receiver assigns the channel taps according to the channel conditions. (See paragraph 69) Furthermore, tap selector selects the filter-tap locations based on the composite CIR provided by channel estimator, and the weights calculator computes the filter coefficients using the output of tap selector. (See paragraph 70)

Therefore, it would have been obvious to one of ordinary skills in the art to have incorporated this feature into the system of Wang, in the manner as claimed, for the benefit of computing the filter coefficients of the receiver.

The reference of Wang discloses the limitations as claimed above, except he fails to explicitly teach an adaptable non-uniform Rake filter including multiple non-uniform tap delay filters to extract delay information from each selected Rake filter coefficient and to configure structure of the multiple non-uniform tap delay filters.

However, the reference of Wang does teach a non-uniformly spaced LMMSE receiver. Such a receiver is a more general version of an L-rake receiver. The LMMSE filter filters the received signal with the filter-tap locations determined by tap selector and filter coefficients determined by weight calculator. (See fig. 5: 420 & paragraph 70) And one skilled in the art would know that the selection of the tap locations gives us some delay information. Furthermore, the reference of Wang also suggests that selecting fewer taps reduces the receiver complexity and improves the numerical

stability (See paragraph 138). And one skilled in the art would know that by selecting fewer taps or more taps would change the configuration of the filter.

Therefore, it would have been obvious to one of ordinary skills in the art to have incorporated this feature into the system of Wang, in the manner as claimed, for the benefit of reducing the receiver complexity and would keep the power consumption at minimum. (See paragraphs 138 & 140-141)

Claim 19 is a method claim corresponding to apparatus claim 1. Hence, the steps performed in method claim 19 would have necessitated the elements in apparatus claim 1. Therefore, claim 19 has been analyzed and rejected w/r to claim 1 above.

5. **Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang. (US Publication 2005/0152486 A1)**

6. Re claim 2, the reference of Wang fails to explicitly teach that wherein the Rake filter coefficient estimator selects the one or more Rake filter coefficients based on channel components having a most signal energy.

However, the reference of Wang does suggest the teaching of selecting channel taps with large energy. (See paragraph 87-94)

Therefore, it would have been obvious to one of ordinary skills in the art to have incorporated this feature into the system of Wang, in the manner as claimed, for the benefit of improving the performance of the receiver.

7. **Claims (3-4, 20 & 24) are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang. (US Publication 2005/0152486 A1)**

8. Re claim 3, the reference of Wang fails to explicitly teach that wherein the Rake filter coefficient estimator selects a Rake coefficient having the most signal energy as a primary Rake filter component from the one or more Rake filter coefficients, wherein the Rake filter coefficient estimator applies a weighted criteria for selection of Rake coefficients corresponding to channel components occurring before and after the primary Rake filter component.

However, the reference of Wang does suggest the teaching of choosing the first tap with the maximum energy always maximizes, or nearly maximizes equation 9. (See paragraph 82) Furthermore, Wang also teaches a heuristic search that first pre-selects the channel taps in the span of the CIR to capture the signal energy. The heuristic search then proceeds to place additional channel taps at certain distances of the pre-selected taps to suppress the interference. One skilled in the art would know that these additional taps that are located at a certain distance from the main lobe (having the highest peak), and that contribute to interference, are the pre-cursor (before) and post-cursor. (after)

Therefore, it would have been obvious to one of ordinary skills in the art to have incorporated this feature into the system of Wang, in the manner as claimed, for the benefit of improving the performance of the receiver.

Re claim 4, the reference of Wang further discloses that wherein the Rake receiver applies the weighted criteria based on knowledge of a specific scenario of a Rake receiver application. (See paragraph 103)

Claim 20 has been analyzed and rejected w/r to claim 3 above.

Claim 24 has been analyzed and rejected w/r to claim 3 above.

9. **Claims (5 & 23) are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang. (US Publication 2005/0152486 A1)**

10. Re claim 5, Wang discloses a Rake receiver for receiving one or more channel components from a transmitter and outputting a channel matched signal comprising: a channel coefficient module that estimates channel coefficients of each received channel component from the transmitter (See fig. 5: 402 & paragragh 70); a Rake filter coefficient module that computes a Rake filter coefficient for each estimated channel coefficient. (See fig. 5: 406 & paragraph 70)

11. But the reference of Wang fails to explicitly that a Rake coefficient selector that selects one or more Rake filter coefficients from the computed Rake filter based on channel characteristics.

However, the reference of Wang does teach that the L-rake receiver assigns the channel taps according to the channel conditions. (See paragraph 69) Furthermore, tap selector selects the filter-tap locations based on the composite CIR provided by channel

estimator, and the weights calculator computes the filter coefficients using the output of tap selector. (See paragraph 70)

Therefore, it would have been obvious to one of ordinary skills in the art to have incorporated this feature into the system of Wang, in the manner as claimed, for the benefit of computing the filter coefficients of the receiver.

The reference of Wang discloses the limitations as claimed above, except he fails to explicitly teach an adaptable non-uniform Rake filter that extracts delay information from each selected Rake filter coefficient on a real time basis and configures structure of non-uniform tap delay filters, and wherein the adaptable non-uniform Rake filter combines the one or more channel components with associated delay information using the configured adaptable non-uniform Rake filter and outputs the adaptively channel matched signal.

However, the reference of Wang does teach a non-uniformly spaced LMMSE receiver. Such a receiver is a more general version of an L-rake receiver. The LMMSE filter filters the received signal with the filter-tap locations determined by tap selector and filter coefficients determined by weight calculator. (See fig. 5: 420 & paragraph 70) And one skilled in the art would know that the selection of the tap locations gives us some delay information. Furthermore, the reference of Wang also suggests that selecting fewer taps reduces the receiver complexity and improves the numerical stability (See paragraph 138). And one skilled in the art would know that by selecting fewer taps or more taps would change the configuration of the filter.

Therefore, it would have been obvious to one of ordinary skills in the art to have incorporated this feature into the system of Wang, in the manner as claimed, for the benefit of reducing the receiver complexity and would keep the power consumption at minimum. (See paragraphs 138 & 140-141)

Claim 23 has been analyzed and rejected w/r to claim 5 above.

12. **Claims (6 & 17) are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang. (US Publication 2005/0152486 A1)**

13. Re claim 6, the reference of Wang further discloses an SNR estimator that estimates SNR (signal-to-noise ratio) (See paragraph 66. The weight vector is used to optimize other design criterias, such as SNR/SINR).

But the reference of Wang fails to explicitly teach an SNR/Delay spread based selector that compares each of the selected one or more Rake filter coefficients to a first threshold SNR value with respect to the channel component having the most signal energy, wherein the adaptable non-uniform Rake filter selects a subset of Rake filter coefficients from the selected one or more Rake filter coefficients such that each of the one or more Rake filter coefficients in the subset have a signal energy higher than or equal to the first threshold SNR value with respect to the channel component having the most signal energy.

However, the reference of Wang does teach a pre-selecting process in which it selects a tap location so that h(t) has largest energy. And then comparing the energy of h(t) to an energy threshold. (See fig. 8: 606 & 608 & paragraph 89)

Therefore, it would have been obvious to one of ordinary skills in the art to have incorporated this feature into the system of Wang, in the manner as claimed, for the benefit of optimizing the performance of the rake receiver.

Claim 17 has been analyzed and rejected w/r to claim 6 above.

14. **Claims (9 & 12) are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang. (US Publication 2005/0152486 A1) in view of Teder et al. (hereinafter Teder) (US Patent 5,544,156)**

Re claim 9, Wang discloses a Rake receiver using an adaptable non-uniform tap delay filters comprising: a channel coefficient module estimates channel coefficients of each received channel component from a transmitter (See fig. 5: 402 & paragragh 70); a Rake filter coefficient module computes a Rake filter coefficient for each estimated channel coefficient (See fig. 5: 406 & paragraph 70).

But the reference of Wang fails to explicitly that a Rake coefficient selector selects one or more Rake filter coefficients from the computed Rake filter based on channel characteristics.

However, the reference of Wang does teach that the L-rake receiver assigns the channel taps according to the channel conditions. (See paragraph 69) Furthermore, tap

selector selects the filter-tap locations based on the composite CIR provided by channel estimator, and the weights calculator computes the filter coefficients using the output of tap selector. (See paragraph 70)

Therefore, it would have been obvious to one of ordinary skills in the art to have incorporated this feature into the system of Wang, in the manner as claimed, for the benefit of computing the filter coefficients of the receiver.

The reference of Wang discloses the limitations as claimed above, except he fails to explicitly teach an adaptable non-uniform Rake filter extracts delay information from each selected Rake filter coefficient on a real time basis and to configure structure of non-uniform tap delay filters, and wherein the adaptable non-uniform Rake filter to combine the one or more channel components with associated delay information using the configured adaptable non-uniform Rake filter and to output a adaptively channel matched signal.

However, the reference of Wang does teach a non-uniformly spaced LMMSE receiver. Such a receiver is a more general version of an L-rake receiver. The LMMSE filter filters the received signal with the filter-tap locations determined by tap selector and filter coefficients determined by weight calculator. (See fig. 5: 420 & paragraph 70) And one skilled in the art would know that the selection of the tap locations gives us some delay information. Furthermore, the reference of Wang also suggests that selecting fewer taps reduces the receiver complexity and improves the numerical stability (See paragraph 138). And one skilled in the art would know that by selecting fewer taps or more taps would change the configuration of the filter.

Therefore, it would have been obvious to one of ordinary skills in the art to have incorporated this feature into the system of Wang, in the manner as claimed, for the benefit of reducing the receiver complexity and would keep the power consumption at minimum. (See paragraphs 138 & 140-141)

The reference of Wang discloses the limitations as claimed above, except he fails to explicitly teach a demodulator to receive the adaptively channel matched signal and to output a decoded signal.

However, Teder does. (See figs 1-2 & 4 & col. 5, line 34 - col. 6, line 46) Teder discloses a rake receiver comprising a channel estimator and a pair of rake demodulators. Furthermore, demodulators are well known components in rake receiver. And they are mainly used to decode/extract the information from received signal.

Taking the combined teachings of Wang and Teder <u>as a whole</u>, it would have been obvious to one of ordinary skills in the art to have incorporated this feature into the system of Wang, in the manner as claimed and as taught by Teder, for the benefit of extracting the information from the received signal, as is well in the art.

Claim 12 has been analyzed and rejected w/r to claim 9 above.

15. **Claims (10-11 & 13-14) are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang. (US Publication 2005/0152486 A1) and Teder et al. (hereinafter Teder) (US Patent 5,544,156)**

16. Re claim 10, the combination of Wang and Teder fails to explicitly that wherein the adaptable non-uniform Rake filter configures register structures of the non-uniform tap delay filters.

The reference of Wang also suggests that selecting fewer taps reduces the receiver complexity and improves the numerical stability (See paragraph 138). And one skilled in the art would know that by selecting fewer taps or more taps would change the configuration of the filter.

Therefore, it would have been obvious to one of ordinary skills in the art to have incorporated this feature into the system of Wang, as modified by Teder, in the manner as claimed, for the benefit of reducing the receiver complexity and would keep the power consumption at minimum. (See paragraphs 138 & 140-141)

Re claim 11, the combination of Wang and Teder further discloses that wherein the adaptable non-uniform Rake filter configures structure of multiplier bank of the non-uniform tap delay filters. (This claim has been analyzed and rejected w/r to claim 10 above.

Claim 13 has been analyzed and rejected w/r to claim 10 above.

Claim 14 has been analyzed and rejected w/r to claim 11 above.

17. **Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang. (US Publication 2005/0152486 A1)**

18. Re claim 15, Wang discloses a system comprising: a bus; a processor coupled to the bus; a memory coupled to the processor; a network interface coupled to the processor and the memory (See fig. 1 & paragraph 5. Furthermore, these features are well known in a communication system.); and a Rake receiver coupled to the network interface and the processor, wherein the Rake receiver further comprising: a channel coefficient module estimates channel coefficients of each received channel component from a transmitter (See fig. 5: 402 & paragragh 70); a Rake filter coefficient module computes a Rake filter coefficient for each estimated channel coefficient (See fig. 5: 406 & paragraph 70);

But the reference of Wang fails to explicitly that a Rake coefficient selector selects one or more Rake filter coefficients from the estimated channel coefficients based on channel characteristics.

However, the reference of Wang does teach that the L-rake receiver assigns the channel taps according to the channel conditions. (See paragraph 69) Furthermore, tap selector selects the filter-tap locations based on the composite CIR provided by channel estimator, and the weights calculator computes the filter coefficients using the output of tap selector. (See paragraph 70)

Therefore, it would have been obvious to one of ordinary skills in the art to have incorporated this feature into the system of Wang, in the manner as claimed, for the benefit of computing the filter coefficients of the receiver.

The reference of Wang discloses the limitations as claimed above, except he fails to explicitly teach an adaptable non-uniform Rake filter extracts delay information

from each selected Rake filter coefficient and to configure structure of non-uniform tap delay filters, and wherein the adaptable non-uniform Rake filter to combine the one or more channel components with associated delay information using the configured adaptable non-uniform Rake filter and to output the channel matched signal.

However, the reference of Wang does teach a non-uniformly spaced LMMSE receiver. Such a receiver is a more general version of an L-rake receiver. The LMMSE filter filters the received signal with the filter-tap locations determined by tap selector and filter coefficients determined by weight calculator. (See fig. 5: 420 & paragraph 70) And one skilled in the art would know that the selection of the tap locations gives us some delay information. Furthermore, the reference of Wang also suggests that selecting fewer taps reduces the receiver complexity and improves the numerical stability (See paragraph 138). And one skilled in the art would know that by selecting fewer taps or more taps would change the configuration of the filter.

Therefore, it would have been obvious to one of ordinary skills in the art to have incorporated this feature into the system of Wang, in the manner as claimed, for the benefit of reducing the receiver complexity and would keep the power consumption at minimum. (See paragraphs 138 & 140-141)

19. **Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang. (US Publication 2005/0152486 A1), as applied to claim 15 above, and further in view of Teder et al. (hereinafter Teder) (US Patent 5,544,156)**

20. Re claim 16, the reference of Wang fails to teach a demodulator to receive the channel matched signal and to output a decoded signal.

However, Teder does. (See figs 1-2 & 4 & col. 5, line 34 - col. 6, line 46) Teder discloses a rake receiver comprising a channel estimator and a pair of rake demodulators. Furthermore, demodulators are well known components in rake receiver. And they are mainly used to decode/extract the information from received signal.

Taking the combined teachings of Wang and Teder as a whole, it would have been obvious to one of ordinary skills in the art to have incorporated this feature into the system of Wang, in the manner as claimed and as taught by Teder, for the benefit of extracting the information from the received signal, as is well in the art.

Allowable Subject Matter

21. Claims (7-8, 18, 21-22, 25-26) are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Contact

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leon Flores whose telephone number is 571-270-1201. The examiner can normally be reached on Mon-Fri 7-5pm Alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LF
December 15, 2007

David Payne
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